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Effects of Behavioral Weight Control Intervention on Binge Eating Symptoms Among Overweight Adolescents

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Abstract

This study examined change in binge eating symptoms reported by moderately overweight adolescents following participation in a behavioral weight control intervention. A total of 194 adolescents across two randomized controlled trials participated. Adolescents in both study samples endorsed a mild level of binge eating symptoms at baseline. Results from both Study 1 and Study 2 indicate a significant reduction in binge eating symptoms following participation in a 16-week weight control intervention, $F(1,60) = 9.43$, $p < .01$ and $F(1,98) = 20.98$, $p < .01$, respectively. Several significant relationships between measures of self-concept and binge eating symptoms were noted, with lower self-concept scores related to higher binge eating symptoms scores at baseline. Changes in binge eating symptoms were also related to changes in physical appearance self-concept, global self-concept and physical self-worth at the end of the intervention. In conclusion, findings from this study support an emerging body of evidence suggesting that dietary restriction, as practiced through participation in a weight control intervention, leads to a reduction in binge eating symptoms among overweight adolescents.

The prevalence of pediatric obesity has increased dramatically over the last two decades, with 33% of children and 34% of adolescents defined as either overweight or obese (BMI for age and gender $\geq 85^{\text{th}}$; Ogden, Carroll, & Flegal, 2008). In addressing pediatric obesity, binge eating has received increasing attention due to the prospective relationship between binge eating and weight gain in adolescence (Stice, Presnell, & Spanger, 2002), as well as the concern that dieting may increase the risk of eating disorder symptoms, such as binge eating (Neumark-Sztainer, Wall, Guo, Story, Haines, & Eisenberg, 2006). Binge eating has also been associated with a greater degree of overweight and has prospectively predicted weight gain from childhood to adolescence and adulthood (Stice et al., 2002). Moreover, recent studies have documented a relationship between binge eating and other negative dimensions of psychosocial functioning among overweight adolescents, including lower self-esteem and body satisfaction, as well as depressive symptoms (Ackard, Neumark-Sztainer, Story, & Perry, 2003; Isnard et al., 2003), highlighting the importance of this symptom.

Several studies have evaluated the prevalence of binge eating episodes among treatment seeking overweight children and adolescents (Berkowitz, Stunkard & Stallings, 1993;

Decaluwe & Braet, 2003). A binge episode is defined as consumption of an objectively large amount of food in a circumscribed period of time with an associated feeling of lack of control and the absence of inappropriate compensatory behavior (DSM-IV-TR; American Psychiatric Association, 2000). Few youth meet criteria for binge eating disorder, and the prevalence of binge eating varies considerably depending on criteria and methods used (Tanofsky-Kraff, 2008). Recent studies of treatment seeking overweight children and adolescents suggest that binge eating symptoms can be a common concern. For example, approximately 24% of a sample of treatment seeking adolescents endorsed recent binge eating (Glassofer et al., 2007), while approximately 39% of a second sample of children and adolescents were classified as having significant binge eating symptoms (Lourenco et al., 2008).

Historically, there has been a concern that dieting, and by extension, participation in weight loss interventions, may precipitate bulimic symptoms, including binge eating and inappropriate compensatory behaviors (Polivy & Herman, 1985). From this perspective, dietary restriction is thought to trigger hunger, which may in turn lead to binge eating episodes, followed by unhealthy weight control behaviors. Support for this dietary restraint model of bulimic symptoms has been provided by a number of prospective studies. Among adolescent girls, self-reported dieting was associated with increased risk for binge eating two years later (Stice et al., 2002). Similarly, in a large sample of adolescents, dieting behaviors increased the likelihood of binge eating and weight gain five years later for boys and girls, as well as extreme weight control behaviors for girls (Neumark-Sztainer et al., 2006). Although prospective studies have documented a relationship between dieting and binge eating, findings from randomized weight control trials that include caloric reduction and behavioral intervention do not support such an association, and suggest a potentially positive effect of treatment on eating disorder symptoms (Raynor, Maier, Dietz, & Kieras, 2006). Furthermore, a randomized trial to directly evaluate the impact of calorie restriction on eating disorder behaviors documented a decrease in bulimic symptoms, as measured by the Eating Disorders Examination (EDE), among non-obese women assigned to a low calorie diet (Presnell & Stice, 2003).

A review of professionally administered pediatric weight control interventions concluded that eating disorder symptoms do not typically increase due to participation in a weight loss program (Butryn & Wadden, 2005). The majority of studies summarized in this review focused on school age children (i.e. mean age of 10–11 years). One study of school age children indicated no change in binge eating or eating disordered behavior following participation in a weight control program that prescribed calorie restriction combined with the traffic light diet (Epstein, Paluch, Saelens, Ernst, & Wilfley, 2001). A second study found a trend for decrease in children's disordered eating attitudes, as assessed by scores on the Children's Eating Attitude Test, at approximately seven months following completion of a weight loss intervention (Levine, Ringham, Kalarchian, Wisniewski, & Marcus, 2001). This trend was observed despite the fact that at the time of follow-up, children had regained the weight lost during the course of active treatment. A long-term follow-up of a subgroup of children enrolled in a cognitive behavioral weight control intervention reported no increased risk of eating disorder symptoms as measured by the Dutch Eating Behavior Questionnaire or the Eating Disorder Inventory (Braet, & Van Winckel, 2000).

Limited data are available regarding changes in eating disorder symptoms among adolescents participating in weight control interventions. One study conducted with adolescents enrolled in an inpatient weight control intervention documented improvements on the dimension of drive for thinness and no significant change on the bulimia subscale of the Eating Disorders Inventory (EDI; Braet, Tanghe, DeBode, Francks, & Winckel, 2003). A second study of an inpatient intervention with adolescents documented a decrease in binge

eating episodes following treatment (van Vlierberghe, Braet, Goossens, Rosseel, & Mels, 2008). Though not an intervention study, longitudinal evaluation of adolescent girls showed that teens who successfully restricted dietary intake, as evidenced by reduction in BMI, demonstrated greater decrease in bulimic symptoms than teens who did not restrict intake (Stice, Martinez, Presnell, & Groesz, 2006).

While numerous studies with adults have directly targeted reduction in binge eating symptoms (Berkman et al, 2006; Brownley, Berkman, Sedway, Lohr, & Bulik, 2007), we are aware of only one investigation that specifically targeted binge eating in overweight adolescents (Jones, et al., 2008). In this randomized trial, adolescents who were at risk of overweight and demonstrated binge eating symptoms were treated with an internet-based weight maintenance intervention, combined with a specific focus on decreasing binge eating (Jones et al., 2008). The intervention was effective in reducing BMI as well as the frequency of binge eating episodes. This program included a specific focus on binge eating, which is one strategy for addressing the challenges of binge episodes. Binge eating symptoms may also be improved through participation in a standard pediatric weight control intervention, through a focus on healthy eating and activity patterns and gradual weight loss (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008).

In summary, while prospective studies have suggested a potential relationship between dietary restriction and eating disorder symptomatology, recent investigations indicate that supervised caloric restriction, as prescribed in a weight control intervention, may have no negative effect and even a favorable impact on binge eating symptoms among overweight children and adolescents. However, the majority of adolescent studies have been conducted in an inpatient setting, potentially limiting the generalizability of these findings to adolescents treated in outpatient settings. Given the limited information regarding the impact of weight control treatment on binge eating symptoms among adolescents, the primary objective of the current study was to evaluate change in self-reported binge eating symptoms following participation in a supervised weight control intervention. We examined this question across two weight control trials that included similar caloric restrictions (1400–1600 calories daily), but differed with regard to the extent to which participants attended to the calorie content of foods. Our primary hypothesis was that adolescents in both studies would report a reduction in binge eating symptoms at the end of the weight control intervention. Given the potential increased vulnerability of adolescent girls to the message of dietary restriction (Neumark-Sztainer, 2005), our secondary hypothesis focused on gender differences. Specifically, we hypothesized that boys would demonstrate greater reduction in binge eating symptoms than girls at the end of the intervention. Finally, we evaluated the relationship between binge eating symptoms and other measures of psychosocial functioning (i.e. self-concept). We hypothesized an inverse relationship, such that reductions in binge eating would be associated with improvements in self-concept.

Method

Study 1

Participants: Participants included 76 moderately overweight adolescents recruited from local newspaper advertisements to participate in a weight control study. All participants met eligibility requirements: between 20 and 80% overweight as defined by body mass index (BMI; kg/m^2), adolescent age between 13 and 16 years, one parent able to participate with adolescent, and English speaking. Exclusion criteria included meeting criteria for a major psychiatric disorder at the time of evaluation, taking medications that might impact weight loss, medical comorbidities that would impact participation in the diet and physical activity prescription, or current enrollment in counseling or a weight loss program. The final sample

was 71% female (N=54) and 29% male (N=22), with an average age of 14.51 years (SD = .93). The average body mass index (BMI) was 32.48 (SD=3.07). The sample was primarily Caucasian (79%) and over half of parents had a college or graduate degree. Sixty-two (82%) of the adolescents completed the end of treatment evaluation.

Procedure—The study protocol was approved by the institutional review boards at Rhode Island Hospital and The Miriam Hospital. Potential participants were initially screened by telephone and any caller who did not meet criteria was offered referral information for community weight management programs. Those who appeared eligible were scheduled for in-person assessment to confirm that all eligibility criteria were met and to complete measures. All assessments were conducted by trained research personnel, including master's and doctoral level clinicians. Written informed consent was obtained from parents and assent from adolescents at the time of assessment. At baseline assessment, adolescents were measured for height and weight and completed a battery of questionnaires including those on binge eating symptoms, self-concept and physical self-worth. Evaluation sessions lasted approximately one hour, and participants were compensated for their time. Responses to questionnaire items did not impact eligibility for study participation. Participants were randomly assigned to either 16 weeks of cognitive behavioral treatment with peer enhanced adventure therapy (CBT+PEAT) or 16 weeks of cognitive behavior treatment with aerobic exercise (CBT+EXER). At the end of the 16-week intervention, adolescents were measured for height and weight and completed measures identical to baseline. Detailed description of study procedures can be found elsewhere (Jelalian, Mehlenbeck, Richardson, Birmaher, & Wing, 2006).

Measures

Anthropometric Variables: Weight was obtained on a balance beam scale in street clothes without shoes. Height was obtained with a stadiometer. Height and weight were used to calculate body mass index (BMI; kg/m^2) as well as percent overweight with reference to age and gender.

Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982) was administered to provide a quantitative measure of binge eating. The measure has high internal consistency (Gormally et al., 1982) and good test-retest reliability ($r=.87$, $p<.001$; Timmerman, 1999), and has been used to assess binge eating symptoms in adolescent samples (Berkowitz, et al., 1993; Isnard et al., 2003).

Self-Perception Profile for Adolescents (SPPA; Harter, 1988). The SPPA is a self-report measure of adolescents' perceptions of their competence in eight specific domains. Domains of interest for the current study include global self-concept, social acceptance, athletic competence, and physical appearance self-concept. Internal consistency for the individual subscales ranges from .74 to .92 and factor analysis indicates identification of a unique factor for each of the eight subscales (Harter, 1988).

Physical Self-Worth was assessed using the Physical Self Worth scale of the Children's Physical Self-Perception Profile (Whitehead, 1995). The scale measures global perceptions of satisfaction and confidence with the physical self, with higher values representing higher self-judgments. High intraclass stability (.86) and alpha coefficients (.94) have been reported in adolescent samples (Whitehead, 1995).

Behavioral Weight Control Intervention: Participants were randomized to one of two treatment conditions, cognitive behavioral treatment combined with peer enhanced adventure therapy (CBT+PEAT) or cognitive behavioral therapy combined with supervised aerobic exercise (CBT+EXER), both of which included dietary and exercise prescription,

and education related to behavioral strategies. Behavioral topics included self-monitoring of diet and physical activity, portion control, problem solving, motivation, and relapse prevention. Each adolescent participated in the intervention with a parent. Adolescents and parents attended separate group meetings, which were held weekly over the course of 16 weeks. The dietary prescription included caloric restriction of 1400 to 1600 calories based on the dietary exchange system. Participants were asked to eat a prescribed number of servings from each of six food groups, including protein, dairy, grains, fruits, vegetables, and fats. Although the dietary plan was based on caloric restriction, participants were asked to attend only to food type and serving size, without attention to calorie content. All participants were asked to gradually increase physical activity to an ideal of at least moderate activity on most days of the week. Unique to the two treatment conditions was the on-site activity program that participants received. Adolescents randomized to CBT+PEAT participated in a peer-based physical activity program designed to increase teamwork and social skills, while those assigned to CBT+EXER participated in supervised aerobic exercise. Details of the intervention components have been described elsewhere (Jelalian, et al., 2006).

Study 2

Participants: Participants included 118 moderately overweight adolescents between the ages of 13 and 16 years recruited from local newspaper advertisements and pediatricians to participate in a weight control study. Eligibility requirements included adolescents between the ages of 13 and 16 years; between 30 and 90% overweight as defined with reference to median BMI for age and gender; at least one parent available to participate; and English speaking. Consistent with Study 1, adolescents were excluded if they met criteria for major psychiatric disorder; were already enrolled in a weight loss program; or had a condition that prevented them from following the diet or physical activity prescription. The final sample was 68% female (N=80) and 32% male (N=38), with an average age of 14.33 years (SD = .99), and was 78% Caucasian. The mean BMI for the sample was 31.41 (SD=3.33). One hundred (85%) adolescents completed the 16-week intervention measures.

Procedure—The study protocol was approved by the institutional review boards at Rhode Island Hospital and The Miriam Hospital. Written informed consent was obtained from parents and assent from adolescents at the time of assessment. Participants were offered monetary compensation for time spent completing initial and follow-up evaluations. All measures, including BMI, binge eating symptoms, self-concept and physical self-worth were collected at baseline and immediately following the 16-week intervention (end of treatment). Initial and end of treatment evaluations were approximately one hour in length. Participants were advised that responses to questionnaires did not affect study eligibility. Following completion of measures, participants (N=118) were randomly assigned to either 16 weeks of cognitive behavioral treatment with peer enhanced adventure therapy (CBT+PEAT) or 16 weeks of cognitive behavior treatment with aerobic exercise (CBT+EXER).

Measures: Assessment of BMI, self-concept, physical self-worth, and binge eating were conducted at baseline and at the end of the 16-week intervention. Measures included were identical to those used in Study 1.

Behavioral Weight Control Intervention: The behavioral and physical activity components of the intervention were identical to those described for Study 1. Unique to this study was implementation of the dietary intervention. Rather than focusing on dietary exchanges as done for Study 1, adolescents were prescribed a specific caloric restriction, ranging from 1400 to 1600 calories daily, and were asked to record both the calorie and fat

content of all foods consumed. Participants were encouraged to consume a range of foods, with a focus on adequate fruits and vegetables.

Data Analysis Plan

The same set of analyses was conducted for Study 1 and Study 2. Mixed factor analysis of variance (ANOVA) was conducted, with time as the repeated measure and treatment condition as the between subjects factor, to evaluate the effect of treatment on binge eating symptoms. A second repeated measures ANOVA was conducted to evaluate whether there were differences in binge eating symptoms related to gender. A final set of analyses was conducted to determine whether dietary restriction, as objectively measured by absolute weight loss, resulted in different findings. The sample was dichotomized based on absolute weight loss achieved during the course of the 16-week intervention, with weight loss of five pounds or greater deemed more successful and weight loss of less than five pounds, less successful. Analysis of variance was then conducted to determine whether effects on binge eating symptoms differed based on weight loss (ie. objective evidence of dietary restriction). The final set of analyses included a series of correlations evaluating: 1) the relationship between baseline binge eating symptoms and each of the dimensions of self concept; and 2) the relationship between change in binge symptoms and change in self-concept during treatment.

Results

Study 1

Repeated measures analysis of variance indicated a significant effect for time on the measure of binge eating symptoms, with adolescents demonstrating a decrease in binge symptoms at the end of treatment, $F(1,60) = 9.43, p < .01$. The time by treatment condition interaction was not significant. A second repeated measures ANOVA was conducted to examine the effects of gender on binge eating symptoms. There was again a significant effect for time, $F(1,60) = 4.70, p < .05$, and the time by gender interaction showed a trend, $F(1,60) = 3.61, p < .06$. Though not statistically significant, examination of this trend indicated that girls started with higher scores ($M = 13.26$ for girls versus $M = 8.95$ for boys) and subsequently decreased to comparable levels ($M = 9.28$ for girls versus $M = 8.68$ for boys). Additional analyses were conducted to determine whether adolescents who were more successful with weight loss (i.e. > 5 pound weight loss) demonstrated a different pattern of results. Forty participants (65%) met this criterion. Repeated measures analysis of variance indicated no significant difference in binge eating scores at either baseline or end of treatment for those participants who were more successful at weight loss.

The final set of analyses included correlations to determine the relationship between baseline measures of binge eating symptoms and self-concept, as well as change in these variables over the course of treatment. As outlined in Table 2, binge-eating symptoms were negatively correlated with global, physical appearance and athletic self-concept, as well as physical self-worth at baseline, such that higher binge eating scores were associated with lower self-concept. Baseline global and physical appearance self-concept, and physical self-worth were positively associated with change in binge eating symptoms, and change in binge eating symptoms was negatively associated with change in global self-concept. Of note, change in BMI was not significantly related to either baseline or change in binge eating symptoms.

Study 2

Table 1 includes baseline data for demographics, weight and binge eating scores. As in Study 1, repeated measures analysis of variance indicated a significant decrease in binge

eating symptoms over the course of treatment, $F(1,98) = 20.98, p < .01$, with no significant effect of treatment condition by time. A second repeated measures ANOVA was conducted to examine the effects of gender on binge eating symptoms. There was again a significant effect for time, $F(1,98) = 14.30, p < .01$, and a non-significant time by gender interaction. With regard to analysis of adolescents who met criteria for minimal successful weight loss, 61% of the sample lost five pounds or more during the 16-week intervention. Similar to study 1, repeated measures analysis of variance indicated no significant difference in binge eating scores for those participants who were more successful at weight loss.

The results of the correlational analyses are presented in Table 2. As observed in Study 1, baseline scores on the Binge Eating Scale were negatively related to baseline measures of physical appearance and global self-concept, as well as physical self-worth. A negative relationship was observed between change in these dimensions of self-concept and binge eating symptoms, such that improved physical appearance, global self-concept, and physical self-worth at the end of treatment were associated with a decrease in endorsement of binge eating symptoms. Unlike the findings from Study 1, there was a positive relationship observed between both weight and BMI change and change in binge eating symptoms, indicating an association between decreasing weight status and decreasing endorsement of binge eating symptoms.

Discussion

Participation in an adolescent weight control program was associated with a decrease in binge eating symptoms across two different study samples. Although focused on binge eating symptoms, these findings are consistent with recent data indicating either no change or improvement in a broad range of eating disorder symptomatology following participation in a supervised pediatric weight control intervention (Butryn & Wadden, 2005).

Contrary to previous findings, there was no significant difference in binge eating symptoms based on gender at any time point. However, there was a trend toward greater baseline rates of binge eating symptoms among girls in Study 1. The lack of consistent gender differences was surprising given previous research indicating higher rates of binge eating among girls (Field et al, 2003). However, previous research indicates higher baseline rates of binge eating symptoms among obese children and adolescents overall (Decaluwe & Braet, 2003) than was found in the current samples. Consequently, the low baseline level of binge eating symptomatology in the current studies may have negated any potential gender difference. Of note, binge eating symptoms did decrease significantly for girls as well as boys, supporting the hypothesis that caloric restriction within a weight control intervention can positively affect binge eating symptoms for overweight youth of both genders.

Adolescents who were more successful at weight loss (as demonstrated by > 5 pound decrease), and by inference, demonstrated evidence of dietary restriction, did not differ from less successful adolescents with regard to change in binge eating symptoms, with both groups showing decrease. However, a relationship between BMI reduction and decrease in binge eating symptoms was observed in Study 2 when the association was evaluated continuously in correlational analyses. The apparent inconsistency in findings may relate to the loss in statistical power associated with dichotomizing the outcome variable (i.e. weight loss), or alternatively, the fact that BMI decreases in adolescents can result from height increase, and are not necessarily contingent on weight loss. Both findings are convergent in demonstrating no increased risk for binge eating symptoms among adolescents who are more successful in weight control interventions. The relationship between BMI reduction and decrease in binge symptoms seen in Study 2 is consistent with previous research demonstrating an association between BMI reduction and decrease in bulimic symptoms

among adolescents (Stice et al., 2006). Similarly, in the context of an intensive adult weight control intervention, reduction in binge eating symptoms was associated with greater weight loss (Presnell, Pells, Stout & Musante, 2007). A potential mechanism explicating this relationship is that participants have fewer binge eating episodes and there is a decrease in caloric intake associated with the binges, leading to more weight loss. An alternative explanation is that participants who are placed on a dietary regimen feel greater control over eating, which leads to decreased binge eating.

In examining the relationship with self-concept, the results were interesting and consistent with previous literature demonstrating an association between binge symptoms and other domains of emotional functioning (Glasofer et al., 2007; Isnard et al., 2003). At baseline, higher binge eating scores were related to lower levels of self-concept, including athletic competence, physical appearance, global self-worth and physical self-worth. Furthermore, decreases in binge eating scores were related to improvements on several dimensions of self-concept, including global self-worth (Study 1 and Study 2) and physical appearance and physical self-worth (Study 2). These findings suggest that adolescents who feel better about themselves are less likely to binge, or alternatively, that a decrease in binge eating is associated with improved self-concept.

The current findings need to be considered in the context of several limitations. First, the current findings are based on a self-report measure of binge eating symptoms, and did not allow for in depth assessment of binge eating or comprehensive evaluation of eating disordered attitudes and behaviors. In addition, participants were excluded from study participation if they actively engaged in unhealthy weight control practices, including use of laxatives and diuretics and self-induced vomiting, or had a history of being diagnosed with bulimia nervosa. Consequently, adolescents with more extreme eating disordered behaviors were not included in the sample. It should be noted, however, that this resulted in exclusion of very few adolescents. A further limitation is the relatively low endorsement of binge eating symptoms among adolescents in both Study 1 and Study 2. Although symptoms of binge eating were not an exclusion criteria for either study, the level of symptoms endorsed is lower than that observed in other samples of adolescents seeking weight control intervention (Lourenco et al., 2008). It is possible that findings would differ with adolescents who endorsed higher levels of binge eating at baseline.

Despite these limitations, the implications of the current study are important. Consistent with findings from previous randomized trials (Butryn & Wadden, 2005; Raynor et al., 2006), weight control intervention does not appear to increase binge eating symptoms in adolescents. The consistency of the overall findings across Studies 1 and 2 highlight this message, even in the context of an intervention that directly targets monitoring of calorie and fat content.

Study findings have specific implications for school psychology. It is important for school professionals who evaluate and work with overweight youth to assess for co-occurring eating disorder symptoms, including binge eating. In addition, referring students to behavioral weight loss programs appears to be a reasonable option, as these interventions may enhance self-concept and decrease binge eating symptoms, rather than exacerbating these concerns. Consistent with this suggestion, a school based intervention to prevent obesity, that included focus on healthy nutrition and physical activity, led to reduced risk of disordered weight control behaviors among middle school girls (Austin, Kim, Wiecha, Troped, Feldman, & Peterson, 2007). In addition, a weight control intervention, focused on enhancing self-esteem, increasing physical activity, and decreasing consumption of unhealthy foods was successfully delivered to adolescent girls in a school setting (Chehab, Pfeffer, Vargas, Chen, & Irigoyen, 2007).

Future research should examine what elements of behavioral weight loss interventions facilitate reductions in binge eating symptoms to allow for generalization to school health curriculums, and in particular, how to best target binge eating symptoms. In addition, future research should include more in depth assessment of binge eating, including the antecedents and consequences surrounding the behavior (Tanofsky-Kraff et al., 2007), and examine the impact of weight control intervention on a broader range of eating disordered symptoms in an adolescent population.

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Table 1

Demographic and descriptive characteristics of participants in two studies of adolescents enrolled in weight management interventions.

	Study 1 (N = 76)	Study 2 (N = 118)
Sex (%)		
Male	28.9	31.9
Female	71.1	68.1
Race/Ethnicity (%)		
Caucasian	78.9	78.0
African-American	9.2	13.6
Other/Multiracial	10.9	8.5
Latino	3.9	9.3
Age (yr.)		
Mean (SD)	14.51 (.93)	14.33 (.99)
Highest Maternal Education Level (%)		
High school or less	2.7	16.1
Some college	17.6	33.9
Vocational degree	27.0	6.8
College graduate	36.5	28.8
Professional degree	16.2	14.4
Initial weight (kg)		
Mean (SD)	86.41 (12.40)	85.18 (14.05)
Initial BMI (kg/m ²)		
Mean (SD)	32.48 (3.07)	31.41 (3.33)
Initial Percent OW		
Mean (SD)	60.56 (15.17)	61.22 (16.79)
Initial Binge Eating Score		
Mean (SD)	12.22 (7.60)	11.34 (7.5)

BMI = Body Mass Index; Percent OW = Teen BMI – BMI at 50th for age and sex/ 50th percentile BMI for age & gender x 100.

Note: There were no baseline differences between participants in the two studies.

Table 2

Correlations Between Binge Eating Scores and Self-Concept Scales

	Baseline BES		Change in BES	
	Study 1 (n=76)	Study 2 (n=118)	Study 1 (n=62)	Study 2 (n=100)
SPP Social Acceptance	-.191	-.139	.085	.165
SPP Athletic Competence	-.445**	.025	.285*	-.019
SPP Physical Appearance	-.428**	-.424**	.404**	.277**
SPP Global Self-Worth	-.482**	-.504**	.421**	.300**
Physical Self-Worth	-.411**	-.310**	.415**	.199*
Weight Change	.021	-.019	.085	.221*
BMI Change	.115	-.053	-.005	.223*
Change in SPP – Social Acceptance	.156	.125	-.199	-.206*
Change in SPP-Athletic Competence	.196	-.005	-.262	-.024
Change in SPP-Physical Appearance	.099	.210*	-.243	-.321**
Change in SPP – Global Self-Worth	.156	.330**	-.330*	-.265**
Change in Physical Self-Worth	.071	.202*	-.202	-.347**

BMI = Body Mass Index; BES = Binge Eating Scale.

*
p < .05,**
p < .01